

Esperimento: 08-01-710

Beamline: BM08 GILDA – ESRF

04 OCT – 07 OCT 2005

”Site location and bonding configuration of Pb and Cu sorbed onto synthetic phosphates“

The aim of the EXAFS measurements was to determine the local rearrangement of heavy metals (Pb and Cu) sorbed onto synthetic hydroxyapatite (HA). HA has been used because of its high removal capacity for divalent heavy metal ions from aqueous solutions.

The EXAFS study was performed to a better understanding of the immobilization mechanisms of the heavy metals by HA. The possible reaction mechanisms are: a) ion exchange involving Ca; b) surface complexation; c) dissolution/precipitation; d) coprecipitation.

EXAFS measurements were carried out at Pb-LIII and Cu-K edge on 8 samples doped with Pb and Cu with different interaction periods (2-48h) and heavy metal concentration (10-300 ppm). Pb and Cu oxides and natural phosphates have been used as standards.

The EXAFS analysis at BM08 shows a Pb-O first coordination shell for all compositions. The second shell contains Ca. Data analysis revealed that Pb “sorbed” onto HA is Pb(II) at $\sim 2.36 \text{ \AA}$. The second shell is at $\sim 4.06 \text{ \AA}$, suggesting that Ca is not substituted by Pb in HA.

Therefore, these preliminary data allow thinking that the main Pb immobilization mechanism could be the surface complexation rather than ion exchange.

Preliminary Cu data analysis shows that copper atoms coordinate 3.5 oxygens, at a distance of $\sim 1.93 \text{ \AA}$. It has been suggested a more distortion of Cu(II) sites and the second coordination shell has not been detected.

